REMARKS

Reconsideration and allowance of the above-identified application are respectfully requested.

Claims 1-80 are currently pending, wherein claims 1, 8, 13-19, 31, 43, 52, 67, 72, 77 and 79 are independent. Claims 19-80 have been added. Support for the new claims can be found at least on page 4, line 24 to page 9, line 27 of the present application. No new matter has been introduced by way of these new claims.

Applicant notes with appreciation the acknowledgment by the Patent Office of the Information Disclosure Statement submitted on April 15, 2004.

Applicant notes with appreciation the acceptance by the Patent Office of the drawings filed on April 1, 2002.

Applicant would like to thank Examiner Esaw Abraham for the personal interview conducted on September 30, 2004. In compliance with M.P.E.P. § 713.04, the substance of that interview is incorporated in the following remarks.

During the interview, the rejection of claims 1-18 under 35. U.S.C. § 103(a) as allegedly being unpatentable over Mörsberger (U.S. Patent No. 6,560,746, hereinafter "Mörsberger") was discussed. No agreement was reached. This rejection is respectfully traversed.

Exemplary embodiments of the present invention are directed to a universal cyclic redundancy check (CRC) generator. More particularly, a universal N-bit capable CRC generator is disclosed which can be programmed to adapt to any given polynomial key word. For example, the universal N-bit capable CRC generator includes N shift registers that are associated with corresponding exclusive OR (XOR) gates. Each of the shift registers

corresponds to a term of a general Nth order polynomial key word. Thus, by nullifying a subset of the shift registers and their corresponding XOR gates, the universal N-bit capable CRC generator can be converted into a specific polynomial key work CRC generator. The selection of the subset of the shift registers and their corresponding XOR gates is based on the desired polynomial key word. The universal N-bit capable CRC generator can be re-programmed each time a new polynomial key word is desired. Thus, the universal N-bit capable CRC generator according to exemplary embodiments can be dynamically programmed to accommodate a new polynomial key word rather than having to build a new CRC generator for each new polynomial word. [*see* present application, page 2, lines 15-29]

During the interview, the Patent Office agreed that independent claims 8, 14, 16 and 18 are patentably distinguishable over Mörsberger. It is respectfully submitted that claims 8, 14, 16 and 18 are allowable.

Dependent claims 9-12 depend from independent claim 8, and it is respectfully submitted that claims 9-12 are also allowable.

With regard to the rejection of claim 1, Mörsberger discloses a parallel CRC generation circuit comprising an input register means, an output register means, a number of XOR gates and a coupling means that feeds predetermined ones of the output lines of the output register means and output lines of the input register means as inputs to the respective XOR gates. According to Mörsberger, a matrix representation of the state change based on the selected CRC polynomial is set up and evaluated, such that the coupling means only uses the minimum number of feedbacks of the output lines and feed-forwards of the output lines of the input register means. [*see* Mörsberger, abstract]

In contrast to the present invention, Mörsberger discloses that *specific* circuits are designed created for *each* CRC polynomial. As disclosed by Mörsberger, "the designer selects the CRC code to be generated by selecting the feedbacks, i.e. by selecting N and which of the coefficients a_n are 0 or 1 depending on the desired CRC code. In the circuit in FIG. 1a this selection of coefficients a_n is reflected by the feedback and the insertion of the particular XOR gates between respective two shift registers." [Mörsberger, column 1, lines 58-63] For example, Figure 1B illustrates a specific serial CRC generation circuit designed for the CRC polynomial given by the equation: $CRC13 = X^{13} + X^{12} + X^7 + X^6 + X^5 + X^4 + X^2 + 1$. The circuit illustrated in Figure 1B is designed to work with *only* the CRC13 equation. In other words, the circuit illustrated in Figure 1B cannot be re-programmed to work with another CRC polynomial, as the circuit has been designed to work with the CRC13 polynomial only. If another CRC polynomial is used, another separate serial CRC generation circuit must be designed.

In addition, the coupling means of the parallel CRC generation circuit illustrated in Figure 1C is merely a switching matrix. According to Mörsberger,

> [t]he coupling means CM determines which of the outputs lines from the input register means I and which of the output lines from the output registers C are input to the respective XOR gates. The coupling means does *not* "couple" the outputs from the input registers and the outputs of the output registers but *merely determines which of the input lines of the XOR gates must receive a separate input from the respective input and output registers*. [Mörsberger, column 2, lines 48-55 (emphasis added)]

The coupling means is a complex switching circuit that is designed for a specific CRC polynomial of a specific length. [*see* Mörsberger, column 3, lines 1-5] As Mörsberger discloses, "[c]onventional design tools perform – *for a given polynomial and length of the*

CRC – a simulation of a serial CRC circuit to find out how the individual entries in the serial shift registers change successively with the input of the T bits. *On the basis of these simulations the coupling means is determined.*" [Mörsberger, column 3, lines 7-12 (emphasis added)] Thus, like the serial CRC generation circuits, the parallel CRC generation circuits are designed for a specific CRC polynomial. [*see also* Mörsberger, column 3, lines 43-51] Consequently, if another CRC polynomial is used, another separate parallel CRC generation circuit must be designed.

In complete contrast to Mörsberger, the universal N-bit capable CRC generator according to exemplary embodiments can be dynamically programmed to accommodate a new polynomial key word rather than having to build a new CRC generator for each new polynomial word. Thus, it is respectfully submitted that Mörsberger does not disclose or suggest the step of "*programming* a subset of the plurality of registers to have a value of zero and programming a corresponding subset of the logic gates to have a value of zero, wherein the step of programming is based on a pre-selected polynomial key word," as recited in claim 1 of the present application. As Mörsberger does not disclose or suggest that either the serial or parallel CRC generation circuits can be programmed, but, rather, a different CRC generation circuit must be designed and built for each specific CRC polynomial, it is respectfully submitted that Mörsberger does not render the subject matter of claim 1 obvious.

Furthermore, according to M.P.E.P. § 2143, to establish a prima facie case of obviousness, three basic criteria must be met. "First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings." [M.P.E.P. § 2143] In other words, "[o]bviousness can only be established by combining or

modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art." [M.P.E.P. § 2143.01]

It is respectfully noted that the Patent Office acknowledges that "Mörsberger **does not explicitly teach** programming subset of XOR (logic gates) to have a zero value." [Office Action, page 3 (emphasis in original)] The Patent Office asserts, however, that "Mörsberger's methods of generating CRC generators is *basically the same* as the applicants' methods of programming registers." [Office Action, page 3 (emphasis added)] The Patent Office goes on to assert that "it would have been obvious to a person having ordinary skill in the art at the time the invention was made to use the method of programming or designing CRC generation circuit as taught by Mörsberger. This modification would have been obvious because a person having ordinary skill in the art would have been motivated to do so because employing a process for programming registers to have a value of zero or one are well known features of CRC generators." [Office Action, page 3 – page 4] It is respectfully submitted that there is absolutely no suggestion or motivation, either implicitly or explicitly, to modify Mörsberger in the manner suggested by the Patent Office, and the Patent Office's suggested motivation for modifying Mörsberger is completely and wholly unsupported by Mörsberger or established tenets of the patent laws.

First, it is respectfully noted that under established tenets of the patent laws, "[t]o establish *prima facie* obviousness of a claimed invention, *all* the claim limitations must be taught or suggested by the prior art." [M.P.E.P. § 2143.03 (emphasis added)] The test is *not* whether a reference teaches "basically the same" the features recited in a claim. The

reference must teach or suggest *all* of the claim features recited in Applicant's claims, and not merely be "close enough." It is respectfully submitted that the Patent Office has failed to show that Mörsberger teaches or suggest each and every feature of claim 1, that the Patent Office is using an incorrect test for obviousness, and, therefore, that the Patent Office has not established a *prima facie* case of obviousness.

In addition, "[t]o establish a prima facie case of obviousness . . . there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings." [M.P.E.P. § 2142] "There are three possible sources for a motivation to combine references: the nature of the problem to be solved, the teachings of the prior art, and the knowledge of persons of ordinary skill in the art." [M.P.E.P. § 2143.01] It is respectfully submitted the Patent Office has provided no reference, citation or other support, in Mörsberger or otherwise, for the bald and unsupported assertion that "employing a process for programming registers to have a value of zero or one are well known features of CRC generators." Again, it is respectfully submitted that the Patent Office has failed to establish a *prima facie* case of obviousness. If this rejection is repeated, the Patent Office is requested to specifically provide a reference, point out a citation, or provide credible support for such a bald and unfounded assertion.

Furthermore, "[i]f the proposed modification or combination of the prior art would change the principle operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious." [M.P.E.P. § 2143.01] As discussed previously, Mörsberger discloses that a different CRC generation circuit (whether serial or parallel) must be designed and built for each specific CRC

polynomial. To modify Mörsberger in the manner suggested by the Patent Office (i.e., make the CRC generation circuits programmable) would fundamentally change the "principle of operation" of the invention disclosed by Mörsberger. Consequently, it is respectfully submitted that the Patent Office has not established a *prima facie* case of obviousness.

For at least the foregoing reasons, as Mörsberger does not disclose or suggest the step of "*programming* a subset of the plurality of registers to have a value of zero and programming a corresponding subset of the logic gates to have a value of zero, wherein the step of programming is based on a pre-selected polynomial key word," it is respectfully submitted that the Patent Office has not established a prima facie case of obviousness.

Rather, it is respectfully submitted that the Patent Office is using impermissible hindsight in an attempt to render the claims of the present application obvious. According to M.P.E.P. § 2142, "[t]o reach a proper determination under 35 U.S.C. 103, . . . impermissible hindsight must be avoided and the legal conclusion [of obviousness] must be reached on the basis of the facts gleaned from the prior art." Furthermore, according to M.P.E.P. § 2143.01, "[t]he mere fact that references can be . . . modified does not render the resultant combination obvious unless the prior art also suggests the desirability of [such modification]." [citing *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990)] Since the Patent Office has offered no proper support or motivation for modifying the reference, it is respectfully submitted that the rejection based on obviousness is wholly and completely founded upon "knowledge gleaned only from applicant's disclosure." [*see* M.P.E.P. § 2145] Consequently, it is respectfully submitted that the rejection entails hindsight and is, therefore, improper.

Independent claims 8 and 13-18 recite features similar to those recited in independent claim 1, and are, therefore, patentably distinguishable over Mörsberger for at least those reasons stated above with regard to claim 1.

Dependent claims 2-7 and 9-12 variously depend from independent claims 1 and 8, and are, therefore, patentably distinguishable over Mörsberger for least those reasons stated above with regard to claims 1 and 8.

With regard to new independent claims 19, 31, 43, 52, 67, 72, 77 and 79, it is respectfully submitted that Mörsberger does not disclose or suggest a CRC generator for generating CRC codes including the features of: a first set of N storage elements, wherein a first selection signal is configured to select a subset of the first set of N storage elements, and wherein each storage element of the subset of the first set of N storage elements corresponds to a term of a pre-selected CRC polynomial keyword; and M logic circuits, wherein an input of each of the M logic circuits is in communication with an output of a corresponding one of the first set of N storage elements, and wherein a second selection signal is configured to select an output of one storage element of the subset of the first set of N storage elements corresponding to a length of the pre-selected CRC polynomial keyword. As discussed previously, Mörsberger discloses both serial and parallel CRC generation circuits that are designed for *specific* CRC polynomials. According to Mörsberger, if another CRC polynomial is used, another separate serial or parallel CRC generation circuit must be designed. Mörsberger does not disclose or suggest the use of first and second selection signals for selecting a subset of storage elements of a CRC generator, corresponding to the terms of a pre-selected CRC polynomial keyword, and the length of the pre-selected CRC polynomial keyword, respectively.

New dependent claims 20-30, 32-42, 44-51, 53-66, 68-71, 73-76, 78 and 80 variously depend from new independent claims 19, 31, 43, 52, 67, 72, 77 and 79, and are, therefore, patentably distinguishable over Mörsberger for least those reasons stated above with regard to new independent claims 19, 31, 43, 52, 67, 72, 77 and 79.

For at least the foregoing reasons, it is respectfully submitted that Mörsberger does not render the subject matter of claims 1-80 obvious. Accordingly, reconsideration and withdrawal of these grounds of rejection are respectfully requested.

All of the rejections raised in the Office Action having been addressed, it is respectfully submitted that the present application is in condition for allowance and a notice to that effect is earnestly solicited. Should the Examiner have any questions regarding this amendment or the application in general, the Examiner is urged to contact the Applicant's attorney, Andrew J. Bateman, by telephone at (202) 625-3547. All correspondence should continue to be directed to the address given below.

Respectfully submitted,

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